



Process engineering for transaminase-catalysed reactions

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Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Woodley, J. (2012). *Process engineering for transaminase-catalysed reactions*. Abstract from Gordon Research Conference, Smithfield, RI, United States.

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Gordon Research Conferences

Conference Program

Biocatalysis

July 8-13, 2012
Bryant University
Smithfield, RI

Chairs:

Stefan Lutz & Hans-Peter Meyer

Vice Chairs:

Joelle N. Pelletier & Oliver May

Related Meeting Information

The Biocatalysis Gordon Research Conference was held in conjunction with the **Biocatalysis Gordon Research Seminar**. Please refer to the Biocatalysis GRS web page for more information.

Biocatalysis encompasses the use of enzymes or whole cell systems for effecting the conversion of readily available, inexpensive starting materials to high value products. Enzymes are fully recyclable catalytic proteins that frequently display exquisite chemo-, enantio- and regioselectivity and operate under mild conditions of pH and temperature. These characteristics make them cost effective and sustainable catalysts for a wide range of chemical transformations. Modern tools of protein discovery, design and engineering aid the development of novel biocatalysts and their tailor-designed integration into industrial processes. Consequently, they find wide application in the production of pharmaceutical intermediates, novel materials and diagnostics, as well as fine, performance and agrochemicals. The Biocatalysis Gordon Conference highlights the best science, technologies and case studies responsible for the understanding, development and practical use of biocatalysts around the world.

Contributors



**SUNDAY**

- 2:00 pm - 9:00 pm Arrival and Check-in (Office Closed 6:00 pm - 7:00 pm)
- 6:00 pm Dinner
- 7:30 pm - 7:45 pm Welcome / Introductory Comments by GRC Site Staff and Chair's Welcome - **Stefan Lutz** (Emory, USA)
- 7:45 pm - 9:00 pm **PAST, PRESENT AND FUTURE OF BIOCATALYSIS**
Discussion Leader: **Stefan Lutz** (Emory, USA)
- 7:45 pm - 8:45 pm Keynote Address: **Jay Keasling** (UC Berkeley, USA)
"Opportunities and challenges for synthetic biology in biocatalysis"
- 8:45 pm - 9:00 pm Discussion

MONDAY

- 7:30 am - 8:30 am Breakfast
- 8:30 am Group Photo
- 9:00 am - 12:30 pm **DESIGN AND ENGINEERING OF BIOCATALYSIS**
Discussion Leader: **Yashuhisa Asano** (Toyama Pref. Univ., Japan)
- 9:00 am - 9:30 am **Uwe Bornscheuer** (Univ. Greifswald, Germany)
"Protein engineering on the move: from directed evolution to *in silico* approaches"
- 9:30 am - 9:45 am Discussion
- 9:45 am - 10:30 am **Pimchai Chaiyen** (Mahidol University, Thailand)
"Biocatalysis by flavin-dependent enzymes"
- 10:30 am - 10:45 am Discussion
- 10:45 am - 11:00 am Coffee Break
- 11:00 am - 11:30 am **Romas Kazlauskas** (Univ. Minnesota, USA)
"New catalytic activities in ancestral, stem-cell-like, enzymes"
- 11:30 am - 11:45 am Discussion
- 11:45 am - 12:15 pm **Clarissa Czekster** (Albert Einstein College of Med., USA)
"Dihydroneopterin aldolase from *Mycobacterium tuberculosis* catalyzes three distinct reactions"
- 12:15 pm - 12:30 pm Discussion

12:30 pm Lunch
1:30 pm - 4:00 pm Free Time
4:00 pm - 6:00 pm Poster Session I
6:00 pm Dinner

7:30 pm - 9:30 pm **DESIGN AND ENGINEERING OF PROCESSES**

Discussion Leader: **Oliver May** (DSM, Germany)

7:30 pm - 8:00 pm **John Woodley** (Technical University of Denmark, Denmark)
"Process engineering for transaminase-catalyzed reactions"

8:00 pm - 8:15 pm Discussion

8:15 pm - 8:45 pm **Toni Glieder** (Austrian Centre of Industrial Biotechnol., Austria)
"New tools and concepts for human drug metabolite synthesis"

8:45 pm - 9:00 pm Discussion

9:00 pm - 9:20 pm **Gjalt Huisman** (Codexis Inc., USA)
"Multi-enzyme reactions for large scale oxidations"

9:20 pm - 9:30 pm Discussion

TUESDAY

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **CASCADE REACTIONS AND SYNTHETIC BIOLOGY**

Discussion Leader: **Joelle Pelletier** (Univ. Montreal, Canada)

9:00 am - 9:30 am **Kristala Jones Prather** (MIT, USA)
"Modularization of pathways to facilitate whole cell biocatalysis"

9:30 am - 9:45 am Discussion

9:45 am - 10:30 am **Sven Panke** (ETH Zurich, Switzerland)
"Optimizing *in vitro* multi-step pathways"

10:30 am - 10:45 am Discussion

10:45 am - 11:00 am Coffee Break

11:00 am - 11:30 am **Claudia Schmidt-Dannert** (Univ. Minnesota, USA)
"Biosynthesis and designer microbes"

11:30 am - 11:45 am Discussion

11:45 am - 12:15 pm **Seung-Goo Lee** (KRIBB, Rep. Korea)
"Development of genetic circuits for rapid and sensitive screening of various enzyme activities from metagenomic libraries"

12:15 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session II

6:00 pm Dinner

7:30 pm - 9:30 pm **ROUND-TABLE: TRENDS IN APPLIED BIOCATALYSIS**

Discussion Leader: **Hans-Peter Meyer** (Lonza)

7:30 pm - 7:45 pm Introduction: **Hans-Peter Meyer** (Lonza, Switzerland)

7:45 pm - 9:15 pm Round Table: **Jeffrey Moore** (Merck, USA), **Kai Baldenius** (BASF, Germany), and **Yoshihiko Hirose** (Amano Enzyme, Japan)

WEDNESDAY

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **BIOCATALYSTS IN SYNTHESIS**

Discussion Leader: **John Woodley** (Technical Univ. of Denmark)

9:00 am - 9:30 am **Yashuhisa Asano** (Toyama Prefectural Univ., Japan)
"Use of enzymes from microbial and plant 'Aldoxime-Nitrile Pathway' for organic synthesis"

- 9:30 am - 9:45 am Discussion
- 9:45 am - 10:30 am **David Berkowitz** (Univ. Nebraska, USA)
"Leveraging New Chemistry-Enlisting Enzymes as Both Catalytic Agents & Reporters"
- 10:30 am - 10:45 am Discussion
- 10:45 am - 11:00 am Coffee Break
- 11:00 am - 11:30 am **Sarah O'Connor** (The John Innes Centre, UK)
"Elucidating monoterpene indole alkaloid biosynthesis"
- 11:30 am - 11:45 am Discussion
- 11:45 am - 12:15 pm **Nick Turner** (Univ. Manchester, UK)
"Design and Evolution of New Biocatalysts for Organic Synthesis"
- 12:15 pm - 12:30 pm Discussion
- 12:30 pm Lunch
- 1:30 pm - 4:00 pm Free Time
- 4:00 pm - 6:00 pm Poster Session I
- 6:00 pm Dinner
- 7:00 pm - 7:30 pm Business Meeting
Nominations for the next Vice Chair; Fill out Conference Evaluation Forms; Discuss future Site & Scheduling preferences; Election of the next Vice Chair
- 7:30 pm - 9:30 pm **FUTURE CHALLENGES AND OPPORTUNITIES FOR BIOCATALYSIS**
Discussion Leader: **Uwe Bornscheuer** (Univ. Greifswald, Germany)
- 7:30 pm - 8:00 pm **Vincent Rotello** (Univ. Mass. Amherst, USA)
"Engineering the nanoparticle-protein interface"
- 8:00 pm - 8:15 pm Discussion
- 8:15 pm - 8:45 pm **Emily Balskus** (Harvard Univ., USA)
"Development of microbially-generated reagents: transition metal catalysis in the presence of hydrogen producing bacteria"
- 8:45 pm - 9:00 pm Discussion
- 9:00 pm - 9:20 pm **Jon Dordick** (RPI, USA)
"Biocatalytic Nanocomposites: Painting a Bright Future"
- 9:20 pm - 9:30 pm Discussion
- THURSDAY**
- 7:30 am - 8:30 am Breakfast
- 9:00 am - 12:30 pm **INDUSTRIAL BIOCATALYSIS**
Discussion Leader: **Gjalt Huisman** (Codexis, USA)
- 9:00 am - 9:30 am **Jeffrey Moore** (Merck, USA)
"Biocatalysis at Merck - lessons from Sitagliptin and beyond"
- 9:30 am - 9:45 am Discussion
- 9:45 am - 10:30 am **Yan Feng** (Shanghai Jiao Tong University, China)
"The design of hyperthermophilic lipase chimeras by key motif-directed recombination"
- 10:30 am - 10:45 am Discussion
- 10:45 am - 11:00 am Coffee Break
- 11:00 am - 11:30 am **Kai Baldenius** (BASF, Germany)
"Moving biocatalysis research out of the chiral niche"
- 11:30 am - 11:45 am Discussion
- 11:45 am - 12:15 pm **Linda Thöny-Meyer** (EMPA, Switzerland)
"Structural insights from random mutagenesis of *Campylobacter jejuni* oligosaccharyl transferase PglB"
- 12:15 pm - 12:30 pm Discussion

12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	<u>Poster Session II</u>
6:00 pm	Dinner
7:30 pm - 9:30 pm	FUTURE CHALLENGES IN GREEN CHEMISTRY Discussion Leader: Hans-Peter Meyer (Lonza, Switzerland)
7:45 pm - 8:30 pm	John Warner (Founder/CTO Warner Babcock Institute Green Chem, USA) "Biocatalysis and materials sciences: examples of green chemistry"
8:30 pm - 8:45 pm	Discussion
8:45 pm - 9:20 pm	Michael Gonzales (Office of R&D, EPA, USA) "The application and role of green chemistry in biocatalysis"
9:20 pm - 9:30 pm	Discussion
FRIDAY	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure